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A Study on Determining Trade Terms for Logistics Efficiency in the Era of Logistics 4.0: Moderated Mediating Effect of Added Value of Traded Goods*

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Abstract

Purpose – The purpose of this paper is to study how flexibility and mutuality in determining trade terms impact logistics efficiency in the context of relational theory. Additionally, the effect of relational contracts on logistical efficiency relative to the value of the goods being traded is investigated.

Design/methodology – According to the relational contract theory, we developed 17 factors utilizing a 7-point Likert scale to measure variables related to flexibility, mutuality, logistics efficiency, and the added value of goods. The survey occurred over four months, and was distributed directly, and via email, phone, and online Google surveys. A total of 403 surveys were collected out of 1,800 distributed, and 380 were analyzed. The principal respondents were import/export companies and members of the Korea International Trade Association and the Korea Small and Medium Business Export-Import Association. The collected data were analyzed using frequency analysis, exploratory factor analysis, and correlation analysis using SPSS ver. 26.0 statistical software, and hypothesis test results were derived using Process Macro ver. 3.5.

Findings – This study provides evidence that negotiation flexibility for trade terms affects the efficiency of the logistics process, and the mutuality of such arrangements is shown to be associated with the flexibility and efficiency of logistics processes. Additionally, it has been established that companies whose trade goods possess a low degree of added value may experience increased efficiency in logistics operations if they agree to trade terms that are both flexible and mutually beneficial with their counterparts.

Originality/value – This study suggests that in an environment of rapidly shifting global logistics and unpredictable related costs, trade companies may be able to improve logistics efficiency by establishing flexible, mutually beneficial trade terms when entering into contracts. Furthermore, it is suggested that companies dealing in low-value-added products may improve the logistical performance of approaching trade from a perspective of relational contracts.

Keywords: Flexibility, Incoterms, Mutuality, Relational Contract Theory, Trade Terms
JEL Classifications: F10, F14, F18

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1. Introduction

Recently, the growth of international commerce has been consistently fueled by advancements in logistics technology. However, the costs and risks associated with international logistics have been increasing rapidly. For instance, maritime freight rates have experienced significant fluctuations due to international political risks, industrial disasters, the monopolization of shipping alliances, and the volatile supply and demand of container ships. In this situation, trading companies have faced a decline in transaction productivity as a result of increased risks and expenses linked to logistics. The Korea International Trade Association (2021) suggested that exporting companies may be able to reduce logistics costs by transitioning to trade terms (International Commercial Terms) C or D of the Incoterms (International Rules for the Interpretation of Trade Terms), which can potentially reduce logistics and warehouse costs. This is because export companies can make favorable decisions when selecting forwarders, customs brokers, and shipping companies during transactions when utilizing Group C or D terms. Conversely, in the case of importing companies, it is possible to control transportation costs related to logistics using Group E or F terms. These terms are considered the most beneficial for buyers due to the level of the visibility, control, and oversight of shipping transactions (Stapleton et al., 2014).

However, the determination of trade contract transaction prices is based on a holistic evaluation of the value of the goods, associated logistics costs, and transaction risks. Macneil's theory of relational contracts posits that the conditions of a contract are not predetermined, but rather emerge through mutual social interaction. Theoretically, it has been suggested that contracts affect not only present transactions but also those that are upcoming. Likewise, in the process of determining trade terms, both trading partners would and should strive to make flexible decisions that maximize mutual benefits and align with their interests. Given these considerations, an assessment of whether the utilization of flexible and mutual trade terms among trade companies impacts business performance is necessary.

Additionally, companies dealing in low-value-added products, such as agricultural products and minerals, can expect decisions regarding trade terms to be critical because logistics costs are likely to constitute a considerable portion of transaction costs. Conversely, companies dealing with high-value-added products will likely place less emphasis on trade terms than those dealing with low-value-added products. It is important to consider the impact of the added value of goods traded by companies when analyzing the flexibility and mutuality of trade terms.

Thus, the purpose of this study is to empirically determine whether the flexible and mutual trade term decisions of trading companies affect logistics efficiency. Additionally, we attempted to determine the effect of the added value of major handling items. To achieve the purpose of the study, we first attempted to understand the effects of flexibility in the trade term determination process on logistics efficiency. Second, we attempted to understand the mediating effect of the mutuality between trading parties in the relationship between flexibility in the process of determining trading conditions and logistical efficiency. Third, when the added value of traded goods is low, logistical costs constitute a relatively high proportion of transaction costs. Therefore, the added value of traded goods can affect trade term decisions, so we attempted to identify the moderated mediating effect according to the level of added value in the relationship between the decision of trade terms and logistics efficiency. This analysis is important because trading parties may differ in the consideration of trade terms

that contain insurance and transport methods, depending on the added value of the product.

To this end, a structured questionnaire was developed through prior research and in-depth interviews with experts. This questionnaire was distributed to member companies of the Korea International Trade Association, the Korean Trade-Investment Promotion Agency, and the Korea Small and Medium Business Export-Import Association, among others. This study utilized 380 sets of questionnaire data, and derived research results using partial least squares structural equation modeling (PLS-SEM).

In previous studies on trade contracts and Incoterms, the optimal conditions for contracts were derived, or studies on factors to be considered were mainly conducted. In contrast, this study differs in presenting the viewpoint that logistics efficiency can be increased by adjusting the terms of trade contracts between the two companies based on Macneil's theory of relational contracts (Sugiono et al., 2022; Unal and Metin, 2021; Yang, 2021; Yu, 2019). This research contributes to the literature and practice regarding the use of trade terms by import and export companies in the following ways. First, based on the theory of relational contracts, we suggest the need for the flexible and mutual determination of trade terms by trading companies. An organic agreement between mutual companies regarding the minimization of the risks and costs that may appear in contracts is effective in terms of the total cost of the contract.

Second, through a review of the impact of the added value of goods handled by trade companies on the utilization of trade terms, we more clearly present the impact of the utilization of trade terms on logistics efficiency. We found that the utilization of trade terms by companies handling low-added-value products radically improves the efficiency of logistics compared to companies handling high-added-value products.

Third, managing trade terms can be an effective solution for trading companies in situations where the uncertainty of costs and risks related to logistics increases due to the unstable supply and demand of containers and the collusive movements of shipping companies. Generally, contracts between trading companies determine customary conditions. However, as uncertainties regarding logistics have increased recently, flexible contract conditions have become important. Therefore, companies should understand the Incoterm-based trade terms and use these from the perspective of total cost when developing contracts.

This paper is structured as follows. In Section 2, the Incoterm trade terms are reviewed based on the theory of relational contracts, and related preceding studies are reviewed. In Section 3, research models and hypotheses are designed based on the content reviewed in previous studies, and variables and measurement factors are constructed. Section 4 describes and discusses the results of the statistical analysis. Section 5 presents the main implications and limitations of the research results and future research directions.

2. Literature Review

2.1. Relational Contract Theory

The determination of trade terms is premised on the agreement of the trading parties. Therefore, in trade, a reasonable compromise emerges in the process of distributing responsibility for logistics-related risks and costs to each trading partner (Karibi-Botoye et al., 2022). According to the relational contract theory, in the process of developing and implementing a contract, trading partners make decisions based on transactional relationships that

appear in the social system during decision-making processes (Macneil, 1980). From a relational contract perspective, the characteristics of flexibility and mutuality appear in the trade term-determining process in trade contracts (Yu, 2019).

From a commercial perspective, trading companies seek to maximize profits and minimize the risks and responsibilities of logistical costs by utilizing trade terms. For example, when one trading party has selling or buying power, market power can emerge, resulting in an advantage in the contract process for that party, providing it leverage to make more flexible contextual decisions (Lan et al., 2019). In this process, companies with market power in the transaction process may exhibit unilateral flexibility toward an opponent (Nikolaidis, 2018). Additionally, the contract's flexibility may appear even when the counterparty to the transaction is substitutable.

However, one party's interest in the trading conditions of a transaction may lead to a request to the other parties to modify the conventionally used trade terms. Thus, the utilization of trade terms to facilitate price adjustments by one side of a transaction can result in a mutual social agreement and understanding of the adjusted price strategy between involved companies (Macchiavello, 2021). In such cases, the transactional situation of mutual companies may intervene. For example, an exporting company can negotiate a logistics contract at a low price if there is a forwarding company with whom it has formed a relationship through long-term transactions. It would therefore be appropriate to use CIF or CFR terms. Alternatively, if the importing company has branches or logistics subsidiaries in the country to which the exporting company belongs, it would be reasonable to select FOB or FCR terms. In this context, negotiations and communications to determine trade terms between trading parties reflect the commercial transactional situation, enabling the supply network to be optimized (Schaefer, 2017).

Therefore, based on flexibility, trade term decisions can be expected to have a mutually positive effect on the continuity of transactional relationships between mutual companies in terms of payment terms or transactional relationships, in addition to transportation costs. This can be a competitive advantage in the market for involved companies due to reduced trading costs (Hajdukiewicz and Pera, 2021).

2.2. Trade Terms and Logistics Efficiency

As trade terms change to reflect international commercial customs, it is important for trade term determination to consider the transportation environment (Durdağ and Delipinar, 2021). Informed decisions are possible if the parties involved are cognizant of the trade terms outlined in the Incoterms. This reduces costs and risks that may appear in the logistics process by reducing logistics costs and improving logistics processes (Yang, 2021). Conversely, a lack of mutual understanding of trade terms may lead to legal disputes, and expose the parties to the risk of serious financial losses (Vidrova, 2020).

Therefore, increasing understanding of the influence of trading terms during the contract development process may lead to increased logistical efficiencies. (Fredriksson and Rappestad, 2016). According to Yaakub et al. (2018), trade companies should consider the logistics process and evolving conditions when deciding on trading terms. This can help control costs and risks effectively, ultimately leading to global competitiveness, and potentially increasing transactional success (Hien et al., 2009).

2.3. Trade Terms and Added Value of the Transaction Goods

The unpredictability of logistics costs is increasing due to the prolonged recession, as well as the strategies of major shipping companies to decrease fleet capacity, leading to the decreased availability of containers. Recently, when the logistics cost index tripled, the increase in freight rates passed on to trade companies was found to have increased six to seven times (Kim and Jeong, 2022). Meanwhile, logistics costs account for 5–20% of the cost of products handled by trading companies (Ioan et al., 2013). For this reason, it is important to determine trade terms using Incoterms, which determine who bears the costs and risks associated with the logistics process. Particularly, companies dealing in low-value-added goods that are particularly susceptible to logistics costs should be especially cognizant of these costs.

Additionally, with the development of logistics technology, trade companies are required to have flexible plans for the flow of information and goods through the logistics process (Yilmaz and Duman, 2019). Therefore, when selecting trade terms, if those that consider the characteristics and movement of goods are selected, logistics route flexibility, improved consistency, and financial benefits can be expected (Stojanović et al., 2021).

Therefore, the added value of traded goods is reflected in the process of determining the trade terms utilized. In cases where logistics costs account for a high proportion of the cost of goods handled, the decision regarding the Incoterm terms and conditions can drive performance within companies and play a more important role in minimizing costs and risks.

3. Research Model and Hypothesis

3.1. Research Model

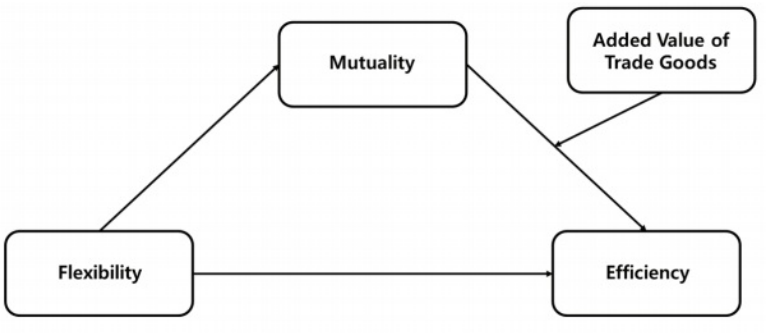
The purpose of this study is to identify the effect of the flexible operation of trade terms on logistics efficiency. Trading companies decide trade terms to determine the target risks and costs for trade goods that appear until trade contracts are concluded. Currently, if a trading company understands Incoterms, and actively and flexibly utilizes these terms, logistics efficiencies based on strategies related to costs and risks including transportation, loading and unloading, bonded warehouses, insurance, and customs clearance will emerge.

Moreover, trading companies consider both commercial benefits and potential hazards to enhance logistical efficiency (Liu et al., 2019; Kim and Jeong, 2021). Since trade terms are determined through the mutual agreement of trading parties, mutual interests must be considered. Trading companies select optimal strategies to sustain enduring alliances and reinforce links between entities within the supply chain to procure a competitive advantage (Kim et al., 2016). Additionally, facilitating flexible operations through the utilization of trade terms can help mitigate the potential risks and costs associated with logistics ports and road transportation infrastructure typically encountered during international trade by establishing pre-defined delivery obligations (Soga, 2021; Wang et al., 2020). In this way, if it is possible to make a flexible decision on the date and method of delivery between the decisions on the trade terms, it is possible to discuss with the counterparty the optimal conditions to avoid risks and costs. Therefore, this study designed hypotheses such that a causal relationship would lead to logistical efficiency.

This study also aimed to identify the effect of the added value of goods handled by trading

companies on the effective relationship of efficiency according to the utilization of trade terms. In a situation where logistics costs fluctuate greatly, the role of trade terms may differ depending on the goods being handled. However, in the case of low-value-added goods, it is typical to use maritime transportation such as barges. Therefore, this study attempted to identify a group in which the use of trade terms should be more emphasized. The conceptual research model of this study is illustrated in Fig. 1.

Fig. 1. Conceptual Research Model



3.2. Research Hypotheses

Parties involved in international commercial transactions seek to reduce both the cost and responsibility associated with logistics, which includes inland transportation, marine transportation, stevedoring, bonded warehouse storage, insurance, and customs clearance. In the international commercial environment, trade companies determine mutual logistics costs and risks through the operationalization of trade terms. However, traders that lack an understanding of Incoterms incur additional costs and risks. For example, if a buyer chooses the CIF condition, the buyer may find it convenient that the seller bears all costs, insurance, and freight, but in the end, it complicates the verification of cargo and insurance documents, and is disadvantageous to the buyer. This difference in logistics rates is due to carriers pricing above base rates to cover insurance, exchange rate fluctuations, and transport risks (Kaye, 2012).

The understanding of Incoterms in the context of commercial transactions facilitates the determination of the trade terms between mutual companies, which reflects the logistics environment (Nikolaidis, 2018). Stojanović et al. (2021) suggested the possibility of reducing a company's logistics costs by improving the flexibility and consistency of logistics routes through the operation of trade terms in trade contracts. Kumar (2010) suggested that such flexible operations could lead to improved logistics lead times. The establishment of explicit trade terms in this manner can provide insight into potential alterations in the logistics environment that may arise from transactions. Therefore, when trading companies can easily alter trade terms, they can effectively reduce logistics costs (Kumar, 2010). Previous research has indicated that optimal logistical costs and performance can be achieved by utilizing mutually flexible logistics strategies with flexible trade terms (Yu, 2019).

Within the usual trade term discourse, it has been recommended that importing companies use Group D terms, and exporting companies use Group E terms to minimize logistical costs

and risks. However, an importing company with market predominance in a rapidly changing logistics environment may benefit from utilizing the Group F conditions of the Incoterms, as it would allow for ship arrangement, management, and tracking. Conversely, exporting companies can effectively control logistics in the supply chain using Group D terms. Therefore, it can be expected that if flexible decisions regarding trade terms are implemented, reduced costs, risks, and lasting relationships are possible by considering the logistics environment between mutual companies involved in the trade.

Hypothesis 1: Flexibility in the process of determining trade terms will have a positive (+) effect on mutuality.

Kumar (2010) suggested that flexibility in determining trade terms between trading companies can shorten logistics lead times and provide a competitive advantage for companies. In this way, mutual understanding and utilization of Incoterms are needed among companies to optimize logistics costs and time through the sufficient awareness of changes in the logistical environment. Nechaev and Schupletsov (2021) suggested that logistics costs and time can be efficiently managed if trading partners have a mutual understanding of Incoterms. Schaefer (2017) proposed that potential disagreements and conflicts concerning the expenses and hazards of logistical processes during trade can be prevented if both trading parties have a mutual understanding of the established trade terms based on Incoterms. Additionally, Stojanović et al. (2021) suggested that when import and export contracts include an understanding of Incoterms, as well as the establishment and implementation of trade terms, the degree of flexibility and consistency of the logistics process between the respective parties is enhanced in the context of future contracts. Therefore, trading companies that thoroughly comprehend mutual Incoterms and select trade terms with logistics in mind can be expected to increase export-related performance.

Yang (2021) proposed that, to augment the global supply chain management efficacy of trading companies, pertinent factors such as product characteristics, logistics capabilities, infrastructure, transaction volume, operating costs, customs regulations, taxation, and accounting should be considered when deciding trade terms. Particularly, the comprehension of Incoterms by both parties decreases the number of lawsuits by removing legal discrepancies between trading entities (Matvieiev et al., 2021). Similarly, it was found that mutual consultations on trade terms involving trading company experts formed partnerships between companies and increased logistical efficiency (Kim and Jeong, 2022). As such, agreements between trading parties can be expected to increase supply chain efficiency by removing unnecessary costs and time that may appear. Therefore, the possibility of reducing logistics costs in trading companies is presented.

Hypothesis 2: In the relationship between flexibility and logistical efficiency in the process of determining formal trade terms, mutuality will have a mediating effect.

As suggested by the Korea Shipowners Association (2022), the ocean freight rate index tripled from 2020 to 2021. However, the increase in freight rates experienced by trading companies was found to be six to seven times higher (Kim and Jeong, 2022). Meanwhile, Sugiono et al. (2022) indicated that logistics contracts are used to control uncertainty regarding logistics infrastructure, or in strategic alliances. Thus, the proportion of logistics

costs within the transaction price of imported and exported goods, as well as the trading companies dealing with high-risk goods, must be carefully considered when determining trade terms to maximize profits.

Therefore, the expected added value of trade goods is likely to have a significant effect on the negotiation of trade terms. This is because logistics costs are relatively high when handling goods with a low added value per unit, such as trade goods like raw materials. Furthermore, the greater the logistics cost relative to the value of the goods, the more companies will engage in dialogues to develop strategies to reduce costs. Therefore, this study hypothesized that trade goods, for which the proportion of logistics costs to product prices per unit is substantial, will benefit from optimized logistical efficiency through the effective utilization of trade terms.

Hypothesis 3: Relative to the effect of flexibility in determining trade terms on logistics efficiency through mutuality, higher logistical efficiency can be expected if trade terms are used for low-value-added goods rather than high-value-added goods.

3.3. Operational Definitions

Table 1 shows the operational definitions of variables and measurement factors used to test hypotheses in this study. Logistics infrastructure refers to the overall logistics-related quality of the country wherein the partner company is located. Cooperation indicates the degree of positive cooperation between companies by flexibly operationalizing the Incoterm trade terms, and in the case of logistics flexibility, indicates the degree to which it is possible to coordinate the selection of a logistics method that flexibly operationalizes Incoterm trade terms. Contract flexibility indicates the degree to which logistics contracts can be adjusted. Additionally, logistics efficiency indicates the degree of cost reduction and profit improvement related to logistics through the flexible operationalization of trade terms.

3.4. Data Collection and Methodology

The study was designed and conducted using the following research methods. First, key variables and measurement factors were derived by reviewing previous research. Then, measurement items focused on the primary variables, including a questionnaire using a 7-point Likert scale, were developed. Additionally, a pilot test with approximately 28 copies was used to assess the suitability of the questionnaire structure.

The distribution and collection of the questionnaire occurred from March 2nd, 2022, to September 30th, 2022. Using face-to-face, e-mail, phone, and Google online surveys, approximately 1,800 copies were distributed. Subsequently, 403 copies were collected, and 380 copies were analyzed. The primary research and survey subjects were Korean import and export companies that were on the Korea International Trade Association active member list and professional trading company list, the Korea Trade-Investment Promotion Agency, and the Korea Small and Medium Business Export-Import Association. The collected data were analyzed, and frequency analysis, exploratory factor analysis, and correlation analysis were performed using SPSS ver. 26.0 statistical software (IBM Corp., Armonk, NY, USA). Hypothesis test results were derived using Process Macro ver. 3.5.

Table 1. Operational Definitions

Classification		Item	References
Flexibility (FL)		The degree to which a flexible contract is determined in the process of determining trade terms	Kumar (2010), Fredriksson and Rappestad (2016)
	FL1	Flexibility in product delivery dates	
	FL2	Flexibility in terms of delivery	
	FL3	Flexibility in unforeseen logistics situations	
	FL4	Flexibility in shipping schedule	
Mutuality (MU)		The degree to which considering the environment of mutual companies is considered in the process of determining trade terms	Schaefer (2017), Nechaev and Schupletsov (2021)
	MU1	Active use of mutual logistics environment	
	MU2	Mutual responsibility and clarity of obligations	
	MU3	Adjust costs according to mutual risk management	
	MU4	Mutual cost-effective choice	
	MU5	Mutual risk-averse choice	
Added Value of Trade Goods (AV)		The level of the added value of primary goods handled by trade companies	Herath and De Silva (2011), Kosfeld and Titze (2017)
	AV1	Investment in technology (R&D) for handling products	
	AV2	High margin per unit	
	AV3	Few competitors in handling products	
	AV4	Irreplaceability of handling products	
Efficiency (EF)		The degree of improvement in logistics efficiency using trade terms	Yaakub et al. (2018), Yang (2021)
	EF1	Logistics cost reduction by the trade terms	
	EF2	Improving work efficiency by the trade terms	
	EF3	Expecting performance in the future by the trade terms	
	EF4	Effective management of risks by the trade terms	

4. Empirical Analysis

4.1. Characteristics of the Study Sample

The characteristics of the sample companies are as follows. Company type consisted of 135 manufacturing companies (36%), 122 logistics businesses (32%), and 114 trading businesses (30%). The primary items handled by the trading companies consisted of household and clothing products for 180 companies (37%), agricultural and fishery products for 73 companies (37%), and machinery and electronic products for 117 companies (31%).

A total of 311 (82%) of the 380 samples had more than 5 years of business experience. Additionally, 290 (76%) companies used FOB and CIF terms as primary trade terms. Therefore, it was judged that suitable samples were secured that adequately represented Korean trading companies because the proportions were similar to those of Korean trading companies presented by Kim and Park (2020).

Table 2. Characteristics of the Study Sample

Company Type	Frequency	%	Product Type	Frequency	%
Manufacturing	135	36	Household	106	28
Logistics	122	32	Clothing	73	19
Trading	114	30	Agro-fishery	73	19
Other	9	2	Machinery	68	18
			Electronic	49	13
			Other	11	3
Company Age	**Frequency**	**%**	**Main Utilized Trade Terms**	**Frequency**	**%**
<3 years	31	8	EXW	14	4
3-5 years	38	10	FCA	44	12
5-10 years	72	19	FOB	194	51
10-15 years	91	24	CFR	28	7
15-20 years	51	13	CIF	96	25
>20 years	97	26	Etc.	4	1

4.2. Exploratory Factor Analysis

Collected questionnaire data were analyzed using principal component analysis with varimax rotation. The survey data showed that the Kaiser-Meyer-Olkin (KMO) index was greater than 0.8, and the *p*-value of the Bartlett test was less than 0.05. This indicates that our principal component analysis was conducted at the appropriate level for social science research (Silva et al., 2021). The commonality and factor loading of each measurement factor for the variables were over 0.50. Therefore, we judged that all measurement factors showed suitability (Maskey et al., 2018). For each derived variable, Cronbach's α was identified for reliability testing. Additionally, the *All* variable was found to be at an appropriate reliability level of 0.70 or greater (Shrestha, 2019). Table 3 shows the discriminant validity, convergent validity, and reliability test results of the study variables.

Table 3. Exploratory Factor Analysis

Item		Communalities	Factor			
			MU	FL	AV	EF
MU4	Mutual cost-effective choice	0.569	0.688	0.169	0.108	0.235
MU5	Mutual risk-averse choice	0.583	0.679	0.342	0.046	-0.057
MU3	Adjust costs according to mutual risk management	0.613	0.678	0.156	0.104	0.343
MU2	Mutual responsibility and clarity of obligations	0.605	0.654	0.250	-0.132	0.312
MU1	Active use of mutual logistics environment	0.608	0.579	0.031	0.122	0.506
FL1	Flexibility in product delivery dates	0.699	0.238	0.800	0.042	0.032
FL3	Flexibility in unforeseen logistics situations	0.614	0.149	0.724	0.001	0.259
FL4	Flexibility in shipping schedule	0.513	0.168	0.620	0.022	0.315
FL2	Flexibility in terms of delivery	0.553	0.482	0.509	0.234	0.079
AV2	High margin per unit	0.674	-0.043	0.076	0.813	0.079

Table 3. (Continued)

Item		Communalities	Factor			
			MU	FL	AV	EF
AV3	Few competitors in handling products	0.610	0.055	0.084	0.773	-0.051
AV4	Irreplaceability of handling products	0.595	0.125	-0.015	0.761	0.017
AV1	Investment in technology for handling products	0.597	0.067	-0.018	0.616	0.461
EF1	Logistics cost reduction by the trade terms	0.644	0.196	0.354	0.205	0.662
EF2	Improving work efficiency by the trade terms	0.607	0.189	0.435	0.003	0.618
EF4	Effective management of risks by the trade terms	0.570	0.455	0.085	-0.023	0.596
EF3	Expecting performance in the future by the trade terms	0.580	0.378	0.406	0.072	0.516
	Eigenvalue		2.946	2.541	2.378	2.369
	% of variance		17.332	14.950	13.986	13.932
	Cumulative %		17.332	32.281	46.267	60.199
	Cronbach's α		0.801	0.746	0.755	0.783

Note 1) Varimax with Kaiser regularization and factor rotation converged in nine iterations.
Note 2) KMO index = 0.889, Bartlett-test: χ^2 = 2380.819, df = 136, p <0.01

4.3. Correlation Analysis

Correlation analysis was performed on the variables supported in the exploratory factor analysis. Pearson's correlation coefficient between variables indicated that flexibility was 0.608 (p<0.01) for mutuality, 0.642 (p<0.01) for efficiency, and 0.190 (p<0.01) for the added value of trade goods. Additionally, mutuality was 0.698 (p<0.01) for efficiency and 0.200 (p<0.01) for the added value of trade goods, and efficiency was 0.243 (p<0.01) for the added value of trade goods. Therefore, the overall variable relationship appeared lower than 0.80, so we judged that multi-collinearity between variables did not occur (Senaviratna and Cooray, 2019).

Table 4. Correlation Analysis

Classification	FL	MU	EF
MU	0.608	-	-
EF	0.642	0.698	-
AV	0.190	0.200	0.243

4.4. Hypothesis Testing

The hypotheses were tested using Process Macro ver. 3.5 in SPSS ver. 26.0. To examine Hypotheses 1 and 2, Process Macro Hayes 4 Model was utilized (Hayes, 2017). Flexibility was found to have a significant effect on mutuality, with β=0.612 (p<0.01). Mutuality had a significant effect on efficiency, with β=0.520 (p<0.01). The direct effect of flexibility on efficiency was significant at β=0.371 (p<0.01). The indirect effect of flexibility on efficiency through Mutuality was significant at β=0.318 (p<0.01). This means that a trading company can determine the optimal trade terms with a counterparty by proposing trade terms based

on an understanding of Incoterms and contract conditions. In addition, the results of this analysis imply that trading parties can increase logistics efficiency. Therefore, both Hypothesis 1 and 2 were accepted.

Table 5. Mediating Effect Analysis (Hayes Model 4)

Classification		Coefficient(β)	Standard Error	LLCI	ULCI
FL → MU		0.612	0.041	0.531	0.692
MU → EF		0.520	0.046	0.430	0.610
Direct Effect	FL → EF	0.371	0.046	0.280	0.461
Indirect Effect	FL → MU → EF	0.318	0.046	0.236	0.417
Total Effect	FL → EF	0.689	0.042	0.606	0.772

To examine Hypothesis 3, the Process Macro Hayes 14 Model was utilized (Hayes, 2018). Flexibility had a significant effect on efficiency, with β=0.354 (p<0.01). Mutuality had a significant effect on efficiency, with β=0.956 (p<0.01). Th added value of trade goods had a significant effect on efficiency, with β=0.658 (p<0.01). Additionally, the interaction between mutuality and added value of trade goods affected efficiency, as β=-0.116 (p<0.01). This result indicates that the lower the added value of trade goods, the greater the logistics efficiency associated with the use of trade terms. However, based on the interaction effect, it is important to review the moderated mediating effect of the added value of traded goods. Accordingly, we judged that the lower the added value of the trade goods, the more logistics efficiency can be increased if trade terms are utilized. Therefore, Hypothesis 3 was accepted in the results of this study.

Table 6. Moderated Mediating Effect Analysis (Hayes Model 14)

Classification	Coefficient (β)	Standard Error	LLCI	ULCI
Constant	-1.931	0.640	-3.189	-0.672
FL	0.354	0.045	0.265	0.443
MU	0.956	0.134	0.694	1.219
AV	0.658	0.164	0.336	0.979
Interaction	-0.116	0.033	-0.180	-0.052

Note 1) Dependent variable: EF
Note 2) R^2=0.583, F-statistics=131.028 (df1=4, df2=375, p=0.000)

The effect of flexibility on efficiency through mutuality, according to the moderating effect of the added value of traded goods, is as follows. If the added value of the traded goods was one standard deviation lower than the average, the indirect effect of flexibility on efficiency through mutuality was significant at β=0.360 (p<0.01). If the added value of the traded goods was average, the indirect effect of flexibility on efficiency through mutuality was significant at β=0.297 (p<0.01). If the added value of the traded goods was one standard deviation greater than the average, the indirect effect of flexibility on efficiency through mutuality was significant at β=0.234 (p<0.01). The adjusted mediating effect index was β=-0.071 (p<0.01). These results suggest that the lower the added value of the traded goods, the more the flexibility and mutuality of trade terms can positively affect efficiency.

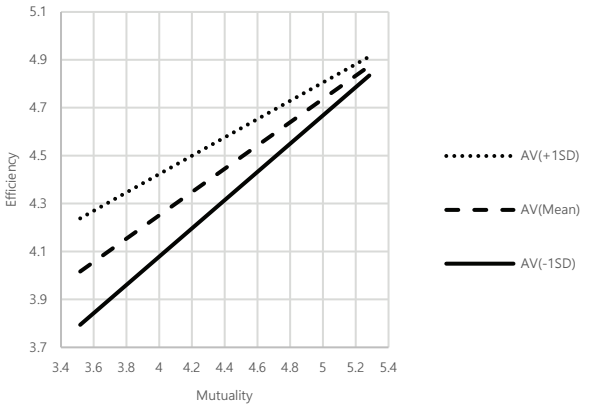
Table 7. Impact of the Added Value of Trade Goods (Hayes Model 14)

Classification	Coefficient (β)	Standard Error	LLCI	ULCI
FL → MU → EF (AV(-1SD))	0.360	0.047	0.276	0.462
FL → MU → EF (AV(Mean))	0.297	0.041	0.223	0.387
FL → MU → EF (AV(+1SD))	0.234	0.043	0.154	0.324

Note 1) Index of moderated mediation: -0.071(LLCI: -0.115, ULCI: -0.034)

Lastly, according to Hayes 14 Model, the relationship between mutuality and efficiency, according to the value-added group of trade goods, is shown in Fig. 2. It can be confirmed that the effect of mutuality on efficiency is positively steeper in the group with low-added-value trade goods. Conversely, it can be confirmed that the effect of mutuality on efficiency is less positively steep in the group with high-added-value trade goods.

Fig. 2. Relationship between Mutuality and Efficiency by a Group of Added-Value Trade Goods



4.5. Discussion

This study was conducted under the assumption that flexibility and mutuality among trading companies in the process of determining trade terms would affect logistical efficiency. Additionally, we assumed that when determining the transaction conditions, the logistics cost of the product is inversely proportional to the value added, and therefore investigated whether the mutual decision of transaction conditions had a greater positive effect on logistical efficiency as the logistics cost increased. The results of this study are as follows.

First, it was found that flexibility in the process of determining trade terms had a significant effect on the mutuality of contracts. To maximize revenue, trading companies must adjust trade terms in response to fluctuations in the shipping charges of carriers, international political tensions, shifts in the logistics environment, transformations in global supply chains, and alterations in market demand. In this study, flexibility in the operational process of

Incoterms trade terms indicates that it is generally feasible to adjust trade contracts. From a total cost perspective, companies choose to engage in transactions with counterpart companies to reduce logistics-related risks and costs (Stojanović et al., 2021; Yu, 2019). The reason for this seems to be that in the changing international commerce environment, if trading companies flexibly manage Incoterm trade terms, these can be adjusted to suit their interests, thereby increasing logistical efficiency. Therefore, those companies with lowered total costs are due to the ability to flexibility evaluate the transaction relationship positively, and conclude contracts that consider mutual transactions.

Second, in determining trade terms, the interaction of contracts between trading parties was found to mediate flexibility and logistical efficiency. It can be expected that flexible choices and decisions that consider the logistics environment of trading companies in the contract process will observe an impact in the direction of increasing logistical efficiency. Presently, it can be judged that the interaction between trading companies mediates some of the effects on logistical efficiency by reducing costs and risks in consideration of the logistics environment in the global market. Prior research suggested that the flexible operation of trade terms will positively affect logistics-related strategies and efficiency gains within trading companies (Yang, 2021; Schaefer, 2017). Based on the results of this study, flexibility in determining transaction conditions has a direct effect on logistics efficiency, and an indirect effect through mutuality. The reason why flexibility and cooperation related to trade terms has a significant effect on logistical efficiency is that costs and risks can be reduced relative to the total transaction, and the ideal pursuit of profits can be agreed upon.

Third, the hypothesis in this study that presented the lower the added value of the traded goods, the higher the effect of the degree to which the utilization of trade conditions improves logistics efficiency was rejected. As usual, it was found that the higher the added value of traded goods, the higher the mediating effect of mutuality in the effect of flexibility in Incoterms on logistical efficiency. However, it was found that increased efficiency due to the increase in mutuality increased more rapidly when the added value of the trade goods was lower than when the value was greater. The results of this study imply two scenarios. The first is that for high-value-added products, the choice of trade terms is vital due to the consideration of logistics-related risks. The importance of timing of risk transfer between a seller and buyer in contracts involving companies that deal with high-value-added products is evident. Logistics risks such as damage, falls, and loss, as well as transportation risks including temperature, humidity, and vibration, can result in a decline in product value. The other implication of the result is that for products with low added value, the selection of trade terms can be used to enhance logistical efficiency. In other words, companies that trade low-value-added goods can further improve logistics efficiency by utilizing trade terms compared with high-value-added goods. Recently, the rapid transformation of the logistics environment, marked by shipping company collusion, port closures, and political crises, has generated a heightened interest in logistics. As a result, as the volatility of logistics costs increases, the importance of considering trade terms that specify the risks and costs related to logistics is growing. Therefore, this study's findings indicate that companies that do not consider mutual trade terms have substantially divergent logistics efficiencies in comparison to those that do.

5. Conclusion

The movement of goods in the international market has been multifarious; however, political, economic, and environmental hazards remain to be identified, and logistical costs are fluctuating significantly. The Korea International Trade Association (2021) proposed the flexible utilization of trade terms as an effective countermeasure against logistical costs. Against this background, this study conducted an empirical analysis to elucidate the effects of the flexible operation of trade terms on logistics efficiency among Korean trading companies. This is because such an attempt identifies that the consideration of trading conditions in trading parties can reduce costs and risks that may occur in a trade. As a result of the study, flexibility in determining trade terms was observed to have a significant effect on mutuality, and mutuality mediated the relationship between flexibility and logistics efficiency. Additionally, in the case of low-value-added products, a higher improvement effect was revealed through flexible and mutual decisions in the process of determining trade terms. The implications of this study are as follows.

First, it was shown through empirical analysis that logistics efficiency is affected by the flexible operation of trade terms targeting Korean trading companies. In trade practice empirical research on Incoterms, studies on the selection of trade terms among trading companies have been primarily conducted using the AHP technique (Unal and Metin, 2021). In contrast, this study is significant because it evaluated the necessity of the flexible and mutual operation of trade terms, and the influence on logistical effectiveness for improving performance in the context of recently increasing logistics costs.

Second, in the review of trade contracts, this study suggested the importance of reviewing relational contract theory. There was criticism that Macneil's theory of relational contracts was difficult to apply to empirical research (St John, 2020), but this study is significant because it overcame this and laid the groundwork for empirical research in the field of trade contracts. In the process of negotiating trade contracts, this study suggested the importance of flexible and mutual relationships between trading parties from the perspective of relational contracts, and away from the perspective of pursuing individual interests based on definitive agreements that appear within the perspective of traditional contracts. Therefore, based on this relational contract theory perspective, this study suggests that mutual interests may affect transactions when reviewing trade contracts.

Third, it was suggested that the flexible operation of trade terms was important in the context of rising logistics costs in the global market. The reason for the change in logistics costs was primarily due to structural problems in the operation of five global shipping companies and container ship supply problems due to a long-term recession, which is expected to continue. Thus, the flexible management of trade terms can have a significant impact on reducing logistics costs, but it is necessary to review flexible management. In this study, it was revealed that the flexible and mutual operation of trade terms according to the logistical situation increases the efficiency of logistics. Likewise, the Korea International Trade Association (2021) proposed a change to the use of Group D terms instead of Group E or F terms to better utilize trade terms by exporting companies. Therefore, in a trade environment with high uncertainty, it is necessary to consider flexible and mutual situations when presenting contractual transaction conditions.

Fourth, for low-value-added products, a flexible and mutual decision is emphasized more in the process of determining trade terms to improve logistics efficiency than for high-value-

added products. The results of this study suggest that the flexibility and mutuality of transaction conditions have a greater effect on logistics efficiency in the case of high-value-added products as compared to low-value-added products. Additionally, in the case of low-value-added products, the degree to which flexibility and mutuality of transaction conditions improve logistics efficiency more rapidly than in high-value-added products. Paradoxically, this indicates that logistics efficiency can be drastically lowered if flexible and mutual decisions are lacking for trade goods that have relatively high logistics costs due to low added value. This is because bulk cargo, such as agricultural products and minerals, are traded under long-term contracts. Therefore, for low-value-added products subject to a rapidly changing logistics situation, a mid- to long-term contract is more sensible than a long-term contract.

Based on the research results, this study prepared a basis for empirical research on the flexible operation of trade terms as a way to reduce the logistics costs of trading companies which were not addressed in previous studies. However, this study is limited by the varying characteristics of the trade companies examined, making it difficult to determine whether the results would apply to international commerce and the associated logistics efficiencies in a particular contractual relationship, cargo, location, and so on. Additionally, given that the survey period occured in a pandemic, in which logistics prices fluctuated greatly, it may be difficult to generalize results to all situations. Accordingly, it is anticipated that future investigations into trade terms will build upon this research and encompass a larger sample of trading companies for each significant handling item category.

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